
Global Rice Science Partnership
CGIAR
Research Program on Rice
Global Rice Science Partnership
Women in motion

The Global Rice Science Partnership (GRiSP), the CGIAR Research Program on Rice, represents for the first time a single strategic work plan for global rice research. GRiSP brings together hundreds of scientists to embark on the most comprehensive attempt ever to harness the power of science to overcome the most pressing development challenges of the 21st century. Cutting-edge science is deployed to develop new rice varieties with high yield potential and tolerance for a variety of stresses such as flooding, salinity, drought, soil problems, pests, weeds, and diseases. Improved natural resource management practices will allow farmers to fully realize the benefits of such new varieties on a sustainable basis while protecting the environment. Future rice production systems are designed to adapt to climate change and to mitigate the impacts of global warming. Policies conducive to the adoption of new varieties and cropping systems will be designed to facilitate the realization of development outcomes. GRiSP will train future rice scientists and strengthen the capacity of advisory systems to reach millions of farmers. For impact at scale, GRiSP scientists collaborate with hundreds of development partners from the public and private sector across the globe.

GRiSP was launched in 2010 and is coordinated by three members of the CGIAR Consortium—the International Rice Research Institute (IRRI, the lead institute), Africa Rice Center (AfricaRice), and the International Center for Tropical Agriculture (CIAT)—and three other leading agricultural agencies with an international mandate and with a large portfolio on rice: Centre de cooperation internationale en recherche agronomique pour le développement (CIRAD), L'Institut de recherche pour le développement (IRD), and the Japan International Research Center for Agricultural Sciences (JIRCAS). Together, they align and bring to the table consortia, networks, platforms, programs, and collaborative projects with more than 900 partners from the government, nongovernment, public, and private and civil society.

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Women in motion

Women play an important role in the global rice sector as both paid and unpaid family labor. In many parts of Asia, women contribute at least half of the total labor input in rice production, performing backbreaking tasks such as transplanting and weeding. After harvest, it is usually the women who take care of seed storage and processing of rice (drying, milling) for home consumption.

In Africa, women undertake much of the work in traditional rainfed and upland rice production systems and play an important role in the rice value chain after harvest. Yet, these women face many constraints because of the prevalence of gender stereotypes and social restrictions that hamper their access to technical knowledge and technologies. It is widely acknowledged that increased participation of women in agricultural research for development and extension will accelerate the realization of development goals, such as reducing poverty and increasing food security.

GRiSP's gender strategy aims to empower women and accelerate the delivery of its development objectives. The term "empowerment" integrates the strengthened role of women in the design, experimentation, and evaluation of agricultural research for development, as well as improved access to resources (e.g., production inputs, knowledge, and improved technologies) and control over output (e.g., harvested rice, processed rice, and other products).

This report provides examples of early success stories, taken from various projects and activities that are part of GRiSP. It demonstrates how well-targeted activities and product development strengthen the role of women in the rice sector and improve gender equity. The examples let women tell their own stories and also explain how GRiSP research led to the products and services that underlie these successes. I hope you will enjoy these stories and join me in helping make this world a place where women can fully reach their potential and contribute to ending poverty and hunger.

Bas Bouman
Director, GRiSP

Women farmers in research and technology development

Thelma Paris
Socioeconomist and gender specialist, IRRI

Rice is intertwined in the fabric of the lives of hundreds of millions of people living in rural areas in Asia and sub-Saharan Africa. Rice production provides staple food, livelihood, and income for poor rice-farming communities. Among poor rice-farming households, labor requirements are met by family members, male and female, and hired workers.

Gender relations and division of labor by gender vary by country, agroecosystem, socioeconomic status, cultural norms, degree of mechanization, market orientation (subsistence and commercialized), and availability of male labor. Women contribute at least half of total labor inputs in rice production in Asia and sub-Saharan Africa.

In spite of the significance of women as unpaid labor or as agricultural wage workers in rice production, postharvest, and processing, their contributions are often under-reported and have remained invisible in agricultural statistics. Consequently, the perception that 'women are not farmers' has led to the exclusion of women in agricultural research-for-development programs. The "invisible" economic contributions of women as producers, farm managers, and income earners have been made visible through the collection of gender-disaggregated data in production and postharvest operations from baseline household surveys.

Identifying gender roles in specific operations and recognizing women-specific constraints, needs, and opportunities in rice value chains and in livestock management have revealed that women constitute a distinct category of consumers and potential beneficiaries of technologies. Therefore, rice and rice-related technologies will have an effect on their labor and income. In turn, the women can strongly influence the development and adoption of technologies, which affect their traditional roles and responsibilities.

In integrating women farmers in rice research and technology development, we should not exclude the men.

Thelma Paris (center) interacts with women's groups in Patuli Village, Nadia District, Chinsurah, India.

Most of the leaders and research managers are men. Thus, it is only through the political will of these leaders that the traditional ways of conducting research will change so that support and opportunities can be provided for women in agricultural research-for-development programs.

We need to have more women in leadership positions and they should be represented more in research teams. Through GRiSP, the Gender Research Team, in collaboration with the IRRI Training Center, has established the *Leadership course for Asian and African women in rice research, development, and extension,* which is offered every year at IRRI. Aside from this women-exclusive leadership course, IRRI is also organizing workshops and training activities for both male and female researchers to ensure that gender inequalities in access to technologies, resources, training, and agricultural information are addressed in each stage of research-for-development processes.

Promoting technologies through strong partnerships with national agricultural research and extension systems (NARES) and nongovernment organizations (NGOs)—particularly those that work with women self-help groups engaged in agriculture and in microcredit programs—have been found to be effective. This model will be expanded through ongoing country projects.

GRiSP partners have catalyzed the development and dissemination of rice technologies through several projects, including Stress-Tolerant Rice for Africa and South Asia (STRASA) and, more broadly, across these other major projects: Cereal Systems Initiative for South Asia, Consortium for Unfavorable Rice Environments, Irrigated Rice Research Consortium, and the CGIAR Research Program on Climate Change, Agriculture, and Food Security.

Despite these efforts, social and cultural barriers and traditional mindsets must change to better support women in rice production without causing disharmony within families. The stories in this report describe several strategies for weaving a gender dimension into current sociocultural environments. For example, sociocultural norms in Bangladesh and some parts of eastern India limit the mobility of women farmers to the confines of their homesteads. They are seldom allowed by their male "guardians" (i.e., husbands and senior relatives) to be consulted or interviewed. These norms restrict the women from achieving their potential economic contributions, which would benefit their families.

The Ashroy Foundation in Bangladesh, however, took an approach to convince men to allow women to participate in research-for-development projects. The Ashroy team conducted a series of meetings and personal consultations with husbands, religious leaders, and other influential people in the local community so that the women may be allowed for interviews and involvement in livelihood activities. This paved the way for development workers to train the women on production of high-quality grain and seed, other income-generating activities, and improved postharvest practices.

In Bangladesh, the *InfoLadies* extension approach is now being used to transfer rice technologies to women farmers who do not have access to information. InfoLadies are young female extension workers who disseminate agricultural information using information and communications technologies.

In eastern India, the involvement of a female farmer in demonstration trials of Swarna-Sub1 inspired her to mobilize 200 female farmers to use the submergence-tolerant rice variety. Women's roles as housewives also change to *de facto* farm managers when their husbands migrate elsewhere for long periods.

A woman in Bangladesh, after receiving training on postharvest management, began to grow the rice variety BINA dhan7 and influenced other farmers to grow the variety. Since the short-duration and high-yielding rice variety was introduced, farmers have been able to grow non-rice crops, such as mustard, between the *aman*- and *boro*-season rice crops, thus increasing their productivity and family income.

These examples show us that providing technologies alongside technical knowledge, through training programs, can empower women as leaders in disseminating technologies or as capacity builders for grassroots women.

Traditional seed distribution schemes are often aimed at men only. However, experience from tribal areas at Mayurbhanj in Odisha, India, reveal that the introduction of Sahbhagi dhan, a drought-tolerant and short-duration rice variety, convinced men and women to do seed trials and become seed growers. Because they needed to conserve seeds for the next season, the women established community seed banks. Growing Sahbhagi dhan allowed women to grow other vegetables after harvesting the rice.

Providing women direct access to stress-tolerant rice varieties and training on production of high-quality seeds, including storage techniques, are helping build their own resilience in adapting to extreme climate events such as drought, floods, and intrusion of seawater into farm lands. Similarly, the formation of women's groups in Nepal has led to the successful establishment of women-managed community seed banks.

Women are gradually breaking their social and cultural confines. Under the STRASA project, women in India, Bangladesh, and Nepal have been participants in activities such as preference analysis, sensory evaluation, and farmer-managed trials in participatory varietal selection. They are now empowered to select new varieties that meet their criteria. They are now also more confident in expressing their opinions on both good and bad traits of new varieties, based on their knowledge gains from participatory varietal selection. Having access to seeds also ensures that their storage bins are full until the next harvest season. Adoption of submergence-tolerant rice varieties, such as Swarna-Sub1, means they spend less time and effort in replanting seedlings. They use their freed time to take

care of household chores, child care, and income-generating activities such as livestock-raising. Gender-inclusive participatory varietal selection is now replicated in rice varietal improvement projects for stress-prone rice environments.

In South Vietnam, women farmers are involved in spraying chemicals to control pests. Excessive use of pesticides can harm human health, including that of women and young children, and it can reduce profit and contribute to pest outbreaks. Involving women was one strategy identified to break the reliance on pesticides. Women farmers underwent training on ecological engineering, which encouraged them to grow nectar-producing flowers around paddy fields to attract bees and other beneficial insects that prey on insects that attack rice plants. The women reported significant change in their beliefs and practices as a result.

Women are now involved in participatory varietal selection.

In Nepal, the drudgery of weeding is mainly a woman's concern. The women thus welcomed the introduction of labor-saving implements, equipment, and improved agronomic practices that lighten their labor and lessen the time they spend weeding.

Working with women farmers' groups has proven more effective than working with individual women farmers. In Burundi, IRRI started to work with 10 groups of ex-combatant women from the civil war by getting each group one hectare of the best irrigated land in the country and showing them how to grow rice on the land. These women received unprecedented access to farm land, farm inputs, and training to produce rice and are now building better livelihoods for themselves, their families, and communities. IRRI researchers taught the women to produce rice while NGOs provided vocational training and psychosocial support to help the women reintegrate into society. In Senegal, packaging and branding of rice helped a women's group increase the competitiveness of local rice in the domestic rice market.

These are but a few stories from experiences on the ground that demonstrate how targeting women in rice research for development can reduce gender disparities in access to technology and training and, eventually, improve the lives of poor women farmers. These stories show us that women, as farmers, can contribute as well as benefit from GRiSP products (e.g., stress-tolerant rice varieties and improved crop management practices, including seed production, postharvest, and processing technologies) and capacity enhancement projects.

Under GRiSP, these mainstreaming strategies are being replicated and expanded in similar environments in collaboration with various partners. Understanding gender roles in the rice value chains and recognizing women's perspectives in technology and dissemination processes matter. This understanding will be crucial in achieving the goals of reducing poverty and ensuring food and nutrition security, while protecting the environment, for thousands of poor rice-farming households living in unfavorable rice environments.

A widow's story

Across a wide range of cultures, widows and unmarried women often make up the most marginalized group. Despite the loss of her social status and her reduced economic circumstances, one widow gains empowerment through modern farming technologies.

Fatema Begum is a 55-year-old widow who lives in a rural village in Bangladesh. In South Asian culture, the social stigma attached to widowhood makes women "invisible." Without a man, it is not unusual for a woman to have little to no recognition or standing in the community.

Challenging fate

But Fatema chose to change the fate that awaited her after her husband's death.

"I became actively involved in managing my farm land since my son migrated to Dhaka to find work," she said. Fatema's farm is a small piece of land, about a quarter of a hectare, on which she cultivated only rice and tobacco.

Fatema joined the rice production training offered by the Cereal Systems Initiative for South Asia (CSISA) in Bangladesh. Through Research Initiatives Bangladesh (one of CSISA's nonprofit partners), Fatema gained access to modern varieties of rice and other crops and learned how to maximize the returns from her land through various cropping systems.

From surviving to thriving

During the 2011 wet season, after her training, she planted BINA dhan7, a high-yielding and early-maturing rice variety that can be harvested in only about 115 days, from seeds provided by CSISA. She direct-seeded rice using a tiller-operated seeder, which greatly minimizes the labor requirement for producing rice.

Although it was the first time she tested her new know-how, her efforts paid off. "With BINA dhan7 seeds and improved crop management practices, I increased my rice production," she said.

She harvested 1,040 kilograms of rice from her field. What's more impressive is that her bumper harvest came during *monga*, the period when other rice varieties are still maturing in the field, leaving farmers with no income and vulnerable to food shortage.

By planting early-maturing rice, Fatima not only improved her food security, but she had enough rice to give to her neighbors and relatives during monga. This enterprising widow also makes extra income from selling rice straw as fodder.

Diversifying her stock

"I also cultivated other crops like wheat, mustard, maize, and jute, which improved my family's livelihood," said Fatema.

After harvesting her rice, she planted modern varieties of wheat (BARI gom26) and mustard (BARI mustard15) on her farm. She harvested 422 kilograms of wheat and 80 kilograms of mustard. After her wheat and mustard crops, she grew maize and jute. Although the maize was damaged by hail, she still harvested 750 kilograms of jute fiber and 1,400 bundles of jute sticks.

Seed of change

"I also received training on seed production and improved storage techniques, like IRRI Super Bags," she added. "I learned the best technique for producing high-quality seeds. I kept my own seeds, and the extra seeds I sold or lent to neighboring farmers."

In 2012, Fatema was named best farmer from the Rangpur hub by IRRI and CSISA at the *International Women's Day* for her extraordinary achievements. But perhaps her most inspiring feat was becoming a pioneer farmer and an agent of change in her village. Her success captured the attention of many farmers, and she provided productivity training to 25 of them.

"A number of farmers came to me for good-quality seeds and also asked for my advice," Fatema said. "I am now transferring these techniques and skills to my neighbors."

Widow with a future

Thousands of women in South Asia fear widowhood perhaps as much as their own mortality. Apart from dealing with the loss of a husband, it often means facing a bleak future burdened with many disadvantages and stigmas. But, Fatema proved that widows can own their future.

Fatema Begum refused to be swept under the rug and be forgotten. She knows her fate is tied to the ownership and productivity of her land and she has taken steps to protect it. She is proof that there is life in widowhood.

Women like Fatema Begum, a widow from a rural village in Bangladesh, now have access to new rice varieties and other crops.

Short-duration varieties

Each rice variety has a different maturity date, meaning they are harvested at different times. Based on this, rice varieties can be classified as: very early (less than 105 days), early (105–120 days), medium (121–135 days), late (136–160 days), and very late (more than 160 days).

Most traditional rice varieties in tropical and subtropical Asia are ready for harvest in 160–170 days and are usually grown once a year. If farmers plant early-maturing or short-duration rice varieties, they can grow a second or third crop of rice, corn (maize), jute, wheat, or legumes within a year.

Short-duration varieties mature faster and can increase farm productivity. The rapid growth of these varieties makes them competitive against weeds, thus reducing the need for and cost of weed control. They also require less water.

IRRI has placed great emphasis on developing rice varieties with shorter maturity. In the 1970s, IRRI released IR28, IR30, and IR36 that mature in 110 days. Subsequently, plant breeders developed IR50 and IR58, which matured in less than 105 days.

Short-duration varieties have led to major increases in cropping intensity, greater on-farm employment, lower production cost, increased food supplies, and improved food security in Asian countries.

More than a woman

Rural women in Bangladesh are responsible for most of the hard work in and around the homestead, yet their work is seldom recognized as part of agriculture. But a woman from a small village in Bangladesh is proving that she is capable of contributing to household food security through improved farming practices.

Selina Akter lives in Sajiali Village of Jessore Sadar in Bangladesh. Like most women in her village, she was involved in some agricultural production activities—from seed selection to harvesting and storage—and in managing livestock. Despite their contributions, local women depend heavily on their husbands (or other adult male family members) because the men make all the decisions in any income-generating activity. In 2011, however, Selina's role changed.

Early that year, Selina's husband, Mohammad Yarab Ali, decided to migrate to a nearby town to work as a laborer. Her husband's decision, although not easy, was necessary. The income from their small farm was so scant they could hardly afford to eat three meals a day. The couple have a son who is in college, and they were determined to see him graduate despite the high cost of education. When her husband left their family farm to work, Selina stepped up to responsibilities that were new to women like her. She became the sole decision-maker in agriculture matters.

A season for change

Every year, Yarab planted the Swarna rice variety during the *aman*, or wet, season (July to October) on the land they owned, which was a fifth of a hectare in size. He harvested 1.1 tons (or 5.5 tons/hectare) on average, which is a good yield, but Swarna is a late-maturing rice variety that takes

150 days before the grains can be harvested, thus allowing only two rice crops a year. Using the late-maturing Swarna not only limited their production, but it also meant they had no source of additional income between the aman and *boro* (dry) seasons.

A few months after Yarab left, Selina signed up for a rice-based farming system training program conducted by the Cereal Systems Initiative for South Asia (CSISA) and the International Rice Research Institute (IRRI), upon the advice of Joti, a nongovernment organization and CSISA partner.

From her new knowledge, Selina decided to grow BINA dhan7, a short-duration rice variety that took only 109 days from sowing to harvest, on a portion of their land, in addition to the Swarna during the 2011 aman season. While waiting for her main crop of Swarna to ripen, she harvested BINA dhan7 and sold more than 75% of it for a price higher than that of Swarna paddy because of better grain quality and early (off-season) availability.

More than a rice farmer

After harvesting BINA dhan7, Selina cultivated mustard (BARI Sarisha15) on that portion of the land and harvested 40 kilograms of mustard seed, some of which she sold. In the following boro season (December to May), she planted BRRI dhan28, another early-maturing rice variety that can potentially yield 6 tons per hectare. She also used rice straw and mustard residue to feed their cattle, which meant more savings for her household.

Selina also underwent training on postharvest management and learned about proper storage of rice seeds. From her first harvest of BINA dhan7, she stored 50 kilograms of seeds using an IRRI Super Bag provided by CSISA. This protected the seeds from moisture, mold, and pests and kept the seeds viable for up to a year.

Sowing her own seeds

In the aman season of 2012, Selina planted BINA dhan7 again, this time on her entire farmland—one-fifth of a hectare—using her own saved seeds. Because she practiced proper seed storage, the germination rate from her rice seeds was more than 80%, indicating good seed vigor and healthier seedlings. Robust seedlings grow faster, have better root growth to absorb nutrients more efficiently from the soil, and produce higher yields.

Selina was very happy to have joined CSISA's rice production program. Since adopting new rice varieties and technologies, her farm has become more productive. And, like the vigorous BINA dhan7 rice seeds that she grew from her own land, her success as a farmer took root in the consciousness of other farmers in her village.

Twenty farmers took Selina's advice and shifted to short-duration rice varieties. To increase their income, they also planted non-rice crops, such as mustard, between the aman and boro rice crops. In the next aman season, she hopes that the number of farmers to adopt short-duration rice will double in the neighboring village so that they, too, can increase their productivity and family income.

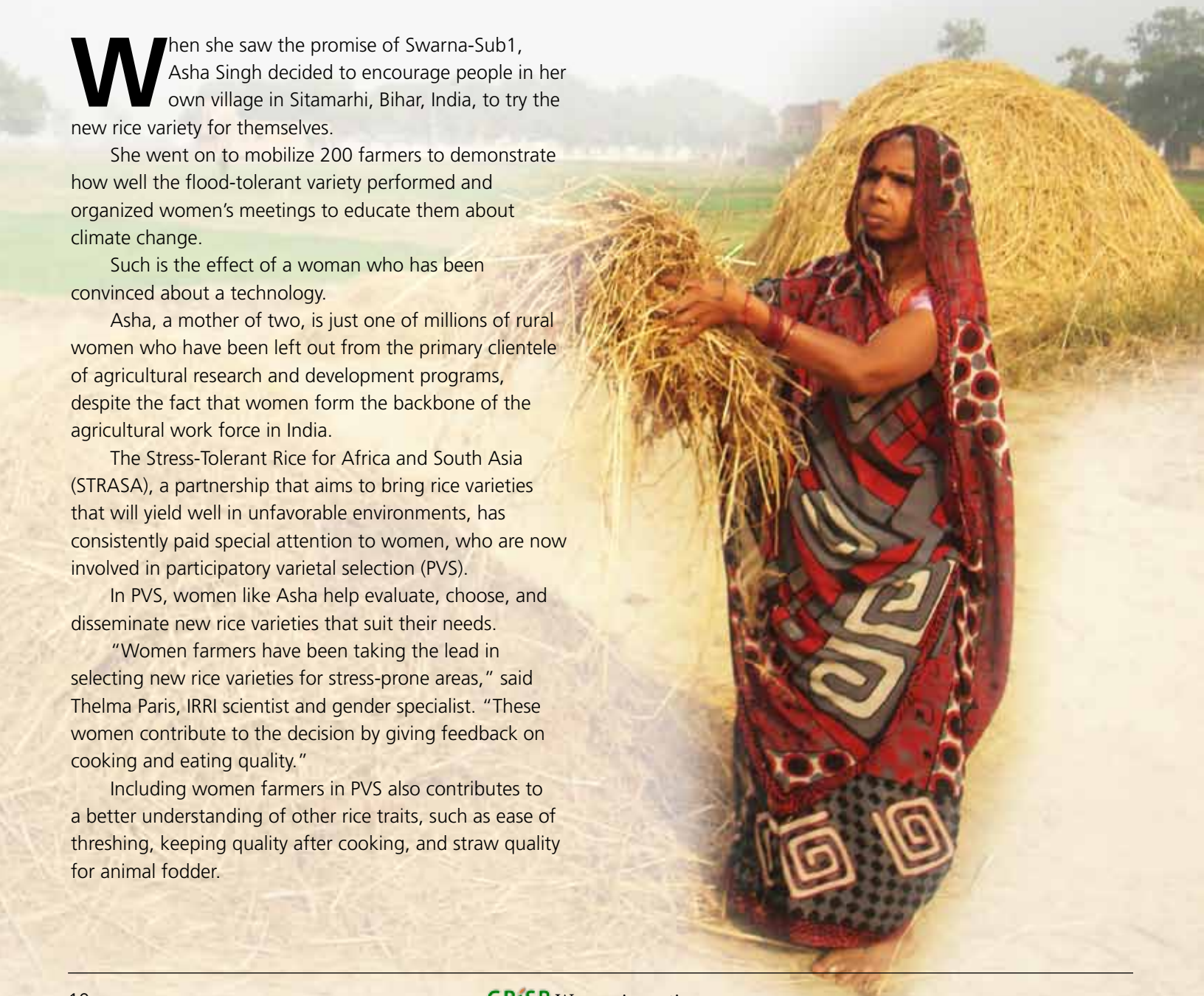
Selina Akter checks the condition of seeds before sealing the IRRI Super Bag.

Family and financial circumstances gave Selina Akter an opportunity to step out of her traditional housewife role. With the right training, she demonstrated the extent of what a woman can potentially contribute to others in her village. She is now a successful farmer who helps lead other farmers to a better future.

The USAID supports CSISA Bangladesh.

Women farmers can be choosers

The flood-tolerant rice variety Swarna-Sub1 helps farmers in low-lying areas cope with floods and has helped improve food security in South Asia. GRiSP, through IRRI and its partners in Asia, facilitates the dissemination of this rice variety to poor farmers and makes sure women farmers receive its full benefits.



When she saw the promise of Swarna-Sub1, Asha Singh decided to encourage people in her own village in Sitamarhi, Bihar, India, to try the new rice variety for themselves.

She went on to mobilize 200 farmers to demonstrate how well the flood-tolerant variety performed and organized women's meetings to educate them about climate change.

Such is the effect of a woman who has been convinced about a technology.

Asha, a mother of two, is just one of millions of rural women who have been left out from the primary clientele of agricultural research and development programs, despite the fact that women form the backbone of the agricultural work force in India.

The Stress-Tolerant Rice for Africa and South Asia (STRASA), a partnership that aims to bring rice varieties that will yield well in unfavorable environments, has consistently paid special attention to women, who are now involved in participatory varietal selection (PVS).

In PVS, women like Asha help evaluate, choose, and disseminate new rice varieties that suit their needs.

"Women farmers have been taking the lead in selecting new rice varieties for stress-prone areas," said Thelma Paris, IRRI scientist and gender specialist. "These women contribute to the decision by giving feedback on cooking and eating quality."

Including women farmers in PVS also contributes to a better understanding of other rice traits, such as ease of threshing, keeping quality after cooking, and straw quality for animal fodder.

The STRASA project is helping women by providing them with flood-tolerant varieties and including them in participatory varietal selection.

It is thus important that women have direct access to good-quality seed and undergo proper training on its production, in preparation for planting in the next cropping season. Meeting the preferences of both men and women in rice varietal improvement will increase adoption rates and ensure household food security.

Sub1 *gene for flood protection*

Although rice typically grows in standing water, it will drown like any other plant when hit with severe flooding. In India and Bangladesh alone, 4 million tons of rice—enough to feed 30 million people—are destroyed by floods every year.

To help solve this annual problem, plant breeders at IRRI added the *SUB1* gene into rice to develop "scuba" rice—high-yielding varieties that can survive submergence of up to two weeks. The *SUB1* gene was discovered by researchers in a flood-tolerant but low-yielding traditional variety that is grown across limited areas in the Indian state of Odisha. The SUB1 gene triggers a hibernation-like response when the rice plant is submerged in water. The plant resumes growth after the water recedes.

The *SUB1* gene was incorporated into Swarna, a very popular variety in South Asia, to create Swarna-Sub1. The new variety retained the desirable traits of the original Swarna and, in the absence of flooding, yields the same. Unlike varieties without the *SUB1* gene, though, Swarna-Sub1 still produces a reasonable yield even after being submerged in floodwaters for up to 14 days.

Swarna-Sub1 is being adopted at an unprecedented rate across South Asia.

Holding back flood, sweat, and tears

Swarna-Sub1 not only helps farmers in the low-lying areas of South Asia cope with floods. For women farmers, the flood-tolerant rice variety reduces their work burden and gives them more time for other activities.

Swarna-Sub1—also called 'scuba rice' because of its ability to survive underwater for up to two weeks—has been a dramatic success story in the flood-prone areas of South Asia. While yield levels of other varieties are drastically reduced by flooding, Swarna-Sub1 is able to produce up to 6 tons per hectare.

Swarna-Sub1 was developed through collaborative work between the International Rice Research Institute and India's Central Rice Research Institute. In 2008, it was introduced in the Indian state of Uttar Pradesh. Now, the benefits of planting it are trickling down, helping make rice farming much more profitable.

Fields of sorrow

Indrawati Yadav, from Dubripur Village of Siddharthnagar in eastern Uttar Pradesh, is a woman who is both a farmer and, by tradition, the caregiver in her household. She tills land that lies in the path of flash floods every year, damaging most of her rice crop and leaving her with not much grain to harvest. Indrawati and many women farmers like her are helpless in dealing with the elements. They are vulnerable to food scarcity and become unable to support their families.

Keeping hope afloat

Things started to turn for the better when Yadav's husband bought 8 kilograms of Swarna-Sub1 seeds from a government store. She and other women members of her family planted the seeds in her farm, a quarter of a hectare in size.

"Swarna-Sub1 is good for the lowlands, which are submerged several times during the monsoon season every

year," said Indrawati. "In our area, most farming households now grow this variety because it yields more and is tolerant of flooding."

Where rice production was previously very unstable, she now has enough rice for her family's needs throughout the year and extra money from selling some of her produce.

"It is more profitable for marginal farmers like me to grow this variety," Indrawati added. "We can recover our expenses on inputs and labor even after a flood."

Swarna-Sub1, which is also less susceptible to diseases, can be harvested in about 130 days after planting. "There is time to grow wheat and other crops in the following season, so we have more food and income for our families," she said.

Less labor pains

"Women used to have to replant the field after a flood. Now we don't have to," Indrawati said.

In addition to household and farm work, the women also manage the livestock. They milk the dairy animals, clean the livestock sheds, and collect animal manure for household fuel or fertilizer. Every day, the women collect rice straw and wheat chaff for fodder while the animals graze in the open fields.

Like a blessing, Swarna-Sub1 has helped ease the work of women farmers. "The quality of its rice straw makes for good fodder for our livestock," she said. "We don't need to walk long distances to look for straw."

Because Swarna-Sub1 is of medium height, it is easier to thresh. "We spend less time now threshing rice, which leaves us more time to take care of our children," Indrawati said. With less farming chores, she and the other women also find time to make mats and other handicraft for household use, instead of buying the items. They can also sell extra items for additional income.

A woman's work is never done

As more men migrate to the cities to find jobs, the women are left behind to tend the farm. Not surprisingly, they are doing quite well in their newfound function.

Swarna-Sub1, a flood-tolerant rice variety, helps ease the burden of women farmers.

Burundi's women of war turn to rice

Women who fought in the civil war of the east African country of Burundi are getting unprecedented access to farm land and training to produce rice and are building better livelihoods for themselves, their families, and communities.

"These ex-combatant Burundi women are turning their own lives around. They just needed a helping hand to get started," said Joseph Bigirimana, liaison scientist and coordinator for the International Rice Research Institute (IRRI) in Burundi. "Now they are helping our country towards rice self-sufficiency and building a more stable future for all Burundians."

In 1993, women fought in Burundi's bloody internal battle, but when peace was installed by 2005, many of them were excluded from reintegration programs. This left them not only physically and mentally scarred but also unemployed, economically destitute, and socially excluded.

To assist a group of 398 women, CARE, Survivor Corps, and the Center for the Training and Development of Former Combatants provided psychosocial support to help them reintegrate. The Council on Integrated Development Burundi gave vocational training for economic development, and IRRI taught them how to produce rice.

"In 2009, we started working with 10 groups of ex-combatant women by getting each group 1 hectare of the best irrigated land in the country and showing them how to grow rice on it," said Bigirimana.

"In the first year, we paid for the cost of renting the land, seed, and fertilizers," he added. "From the profits they made in the first season, they were able to pay these costs themselves the following year."

During a group interview with the women involved in the project, they all said that the most important aspect of the project was that it gave them access to land, which they would not have had without IRRI, CARE, and the cooperation of the Burundian government.

IRRI, CARE, and the Burundian government have helped women contribute to a rice self-sufficient country.

Access to land and knowledge in rice farming gave women ex-combatants a chance to reintegrate into society.

Elisabeth Nibigira, one of the participants and a mother of four, added, "With the IRRI project, I now feel reintegrated into society. I do not feel afraid of people like I was during my combatant life, and other people do not see me like an excluded ex-combatant any more."

"When I was not growing rice," she added, "I used to eat rice only on feast days or when I received money for my labor. Now, with IRRI assistance, I produce rice myself and I can eat rice with my children whenever I need it."

The women were taught how to grow rice and test new rice varieties and farming technologies through a farmer field school. In a common field, representatives of the women's groups learned all aspects of rice production, from land preparation to rice harvesting and drying. Back in their own fields, these women taught their colleagues what they learned.

The women were very enthusiastic about the continuing development of their skills and their rice production. They want to mechanize rice production to improve the efficiency of their operation, increase profit, and reduce labor.

"The first thing we would like to have is the milling machine because then we will not have to pay for milling," said Nibigira. "Other farmers will come to us to mill their rice, which will provide us with income to feed our families. We could then produce rice bran for our cattle or for selling."

In collaboration with the Faculty of Agriculture at the University of Burundi, IRRI is continuing the project based on its outstanding success, but is seeking funding to include more women in the program and support the current women involved to further develop their rice production skills and improve their access to technology. The pilot project was financially supported by the Howard Buffett Foundation.

Capacity enhancement for women

The participation of women compared with that of men in degree and nondegree training courses had been low in the past. In the beginning, IRRI training programs were male-dominated. Starting with only two female scholars in 1962–65, the number of women who received training from IRRI increased to more than 2,400—and counting—with a continuous effort to achieve gender balance in capacity building.

IRRI, through its Training Center, has encouraged the participation of women in its training courses and tailors some courses specifically for them. In recent years, IRRI has focused on developing women leaders on research for development through training. From 2002 to 2012, 200 women from 26 countries participated in leadership training courses for Asian and African women in agricultural research, development, and extension. From 2007 to 2012, half of IRRI scholars were women.

Aside from developing the leadership skills of Asian and African women in agriculture, the training course aims to make them effective agents of change in the agriculture sector and trainers of grassroots women on improved crop production, processing, and seed management. Women and men also participate in courses on all aspects of rice production—breeding, land preparation, crop and pest management, postharvest, and the latest technologies in farm management and rice farming from seed to market. Both male and female participants were involved in nondegree training courses to help improve their report-writing and presentation skills for effective technology dissemination.

Opportunities for women to participate in training courses on scientific research, scholarships for MS and PhD students, and postdoctoral fellowships are provided on a competitive basis to increase women's participation in rice science and research in the various themes of GRiSP. Short-term courses on mainstreaming gender in each GRiSP theme will also be provided to ensure that gender issues in research and development are addressed. Consideration of gender issues in GRiSP is expected to greatly enhance the efficiency and impact of research as well as reduce gender inequalities in access to technologies and capacity-enhancement programs.

IRRI is a gender-sensitive workplace, with women comprising 37% of all IRRI staff worldwide, 57% of all headquarters-based nationally recruited scientists, and 33% of IRRI's senior management.

Flowers to restore balance

By planting flowers around rice paddies, women farmers in Vietnam are saving 42% on insect-control costs.

Women from Tien Giang Province underwent a training course on keeping rice fields ecologically sound and balanced—that is, by planting flowers all around, a practice called ecological engineering. "Friendly" insects and other organisms that live in the diverse vegetation around the rice fields help control pests of rice, such as the brown planthopper.

The misuse of pesticides can break down the natural defenses of rice fields by killing off the natural enemies of pests. This can contribute to pest outbreaks. Chemicals used to control pests are marketed in such a way that farmers may be led to believe that they need to use them, even if they do not.

As part of a joint project between the International Rice Research Institute (IRRI) and the Asian Development Bank (ADB) in March 2012, 200 women from 10 districts in Tien Giang were taught how natural biodiversity in their farms can be preserved.

"After ecological engineering was introduced, farmers' insecticide use dropped by 21.6%," said Monina Escalada, communication consultant. "Their spending for insect control also went down from US$27 to US$16—an almost 42% decline."

In the winter-spring cropping season of 2012–13, a more intensive training for 505 more women on ecological engineering was conducted with farmer groups in 13 villages in Cai Lay District. The trainees were taught to observe the increase in bees and parasitoids (or 'small bees') that visit the nectar-producing flowers grown on bunds, and preserve them.

"The flowers bring in numerous bees as well as 'small bees,' or parasitoids, that are important in controlling pests," said Ho Van Chien, director of Vietnam's Southern Plant Protection Center. "Ecological engineering has enabled women farmers to appreciate the value of the 'small bees' and consciously protect them from harmful insecticides."

"If the women continue to apply what they have learned, households will save as much as US$50–100 per season in the long term from less insecticide inputs and reduced production loss," said K.L. Heong, IRRI principal scientist and entomologist.

Ecological engineering

Planthopper outbreaks can cause serious losses in rice production. In China, for example, crop damage reached 2.8 million tons in 2005. In 2007, Vietnam suspended rice exports because of losses caused by planthoppers. The persistent outbreaks in Indonesia have caused severe losses, covering more than tens of thousands of hectares since 2008.

Between 2009 and 2011, more than 3 million hectares in Thailand were infested with planthoppers, causing losses of more than 1.1 million tons of paddy that had an export potential of US$275 million.

Planthopper outbreaks happen when there is a breakdown in the natural ecological balance of predators and preys in the rice field. When pesticides are abused, natural pest predators such as spiders, aquatic bugs, and wasps are also eliminated, creating an environment that allows planthoppers to thrive and multiply.

Ecological engineering is a scientifically proven approach to better manage pests by promoting and restoring the natural ecological balance in rice fields so that predators of pests remain present. In this approach, farmers depend less on pesticides and, instead, only have to cultivate nectar-producing flowers around the rice fields to encourage predators.

In the Mekong Delta of Vietnam, through a campaign called *Ba Giam, Ba Tang* (Three Reductions, Three Gains, or 3R, 3G) rice farmers were encouraged to lower their seed rates and nitrogenous fertilizers by 30% and insecticide sprays by 50%. When farmers adopted these practices, they were able to not only increase their income but to also lower their health risks from exposure to pesticides. Adopters of these practices found that they can earn more—about $58 per hectare and $35 per hectare in the dry and wet seasons, respectively, or $93 more per year.

Women build a brand

To help local rice compete with imported rice, which dominates the market, an AfricaRice research team conducted a study that examined the role of labeling in helping raise the demand for local rice varieties in Senegal.

Appearances were the subject of the day in a study involving African women that sought to understand how marketing influences consumer preference between locally produced and imported rice.

In Africa, women undertake much of the work in traditional rainfed, mangrove, and upland rice production systems. However, African women are often marginalized with regard to access to land for growing rice, particularly in irrigated ecologies. They have thus typically specialized in postharvest activities such as processing, quality control, and marketing.

Here, some women's organizations have taken up the question of how local rice can be effectively marketed to consumers so that it can compete against massive rice imports.

In Senegal, where women decide what type of rice to buy, AfricaRice worked with a local women's association, Khar Yalla Gueye, in Dakar and Saint-Louis to test the effectiveness of intervention in helping women market local rice varieties more effectively. AfricaRice is a partner of the International Rice Research Institute (IRRI) under GRiSP.

When making a purchase decision, consumers look for desired qualities in a product. These are intrinsic attributes, such as postharvest grain quality, purity, taste, and fragrance. However, extrinsic quality cues, such as labeling, certification, information, and promotion campaigns for a product, influence consumers' perceptions.

The study revealed that 47%, or almost half, of the 241 Senegalese women surveyed relied on attributes of the rice bag (container) when deciding which variety to buy. The women were even willing to pay 17% price premiums for their preferred brands. This supports the importance of good packaging for local rice in countries where consumers have a strong attachment to imported rice.

"Marketing is an important tool in adding value to local rice in Senegal and should be used effectively as

Appearances matter. Packaging helps local rice become competitive in the market.

Packaging and branding is an important part of marketing locally produced rice to increase demand and create a successful domestic rice sector.

organizations work toward increasing demand and creating a successful rice sector," said Matty Demont, senior economist at IRRI. "Investing in a home brand and creating a distinguishable commercial identity for Khar Yalla Gueye in Pont Gendarme may be one step toward increased competitiveness of domestic rice in Senegal, with concomitant impact on women's livelihoods."

AfricaRice is providing training programs in business, entrepreneurship, and marketing; mechanized processing; and branding and promotion of local rice in Senegal.

The study was conducted with financial support from Syngenta and additional funding from a Fulbright grant.

Various branding styles of rice sold in Senegal markets.

A woman's touch saves seeds

Aroti Roy is a female farmer at the Auskhali Village in Batiaghata Upazila, Khulna District, Bangladesh. In her homestead, she is responsible for postharvest operations (drying, winnowing, selecting, and storing seeds), cattle- and poultry-rearing, daily household chores such as cooking and collecting water, and child care.

In 2011, Aroti attended a training activity by CSISA-Bangladesh on *aman* (wet season) rice production and improved postharvest management practices for rice, including seed storage. In the following aman season (2012), she applied and shared her new knowledge with her neighbors, and then later, with her husband.

Aroti advised her husband, Swapon Roy, on seedbed preparation, recommending that he establish a raised seedbed, which requires less seed than the conventional seedbed system. The traditional way of seedbed preparation also tends to damage some seedlings because of water pooling in depressed parts, thus weakening the seedling.

"Her advice and encouragement resulted in healthy rice seedlings. I was then able to transplant these in the same piece of land using only half the usual seed rate," Swapon said of his wife. "She also reminds me of the importance of the right dosage and timing of applying chemical fertilizer and weed management."

Swapon began to practice line transplanting of rice, which reduced the number of seedlings needed, and started to use integrated pest management.

With Aroti's new knowledge on producing good healthy seeds and improved seed storage, she decided to keep her own seeds this year and sold the extra seeds to her farmer-neighbors. The training she received enabled her family to become seed producers, which provides an extra and independent income. She also uses IRRI Super Bags to store seeds and even painted the earthen pots for seed storage.

Aroti and Swapon grew BRRI dhan53, a new salt-tolerant rice variety, making it possible for them to grow *boro* (dry season) seedlings early. She also cultivates Napier grass on the dike of her gher to feed the cattle, which means she no longer has to collect as much rice straw as before.

This work is led by the Ashroy Foundation as part of the Cereal Systems Initiative for South Asia (CSISA) in Bangladesh. The International Rice Research Institute, as part of GRiSP, provided technical guidance and demonstration of the technologies.

Aroti Roy, farmer from Auskhali Village in Batiaghata Upazila, inspects the seeds she stored using improved postharvest methods.

Postharvest management practices

Rice lost after harvest can fall between 10% and 25%, which makes the amount of grain that gets to the market and to consumers significantly less than the actual harvest.

Postharvest losses are caused by shattering, spillage, waste, pest damage, and inefficient rice milling. In addition to physical loss, poor postharvest management causes delays in delivery, which reduces market prices of milled rice by 10–30%. Examples of postharvest problems are improper storage, labor shortage, outdated postharvest equipment, and low operator skills, all of which lead to a loss of quality and, sometimes, contamination.

Reducing postharvest losses in terms of quantity and quality helps increase farmers' returns from the rice harvest and results in more rice available in the market. This contributes to food security and ensures that consumers get higher quality rice.

IRRI develops and supports the rollout of key technologies that can help reduce postharvest losses, such as mechanized harvesting, and modern technologies for drying, storage, and processing. IRRI Super Bags, for example, are reusable air-tight plastic bags that protect stored rice from moisture, insect pests, and rats, and keep rice seeds viable. Many of the losses incurred after harvest stem from poor storage conditions. The benefits of the IRRI Super Bag have been verified with tens of thousands of farmers throughout Asia, through national partnerships. IRRI Super Bags are commercially available in some countries.

IRRI also works to get technologies to end-users on a broad scale by creating postharvest learning alliances, providing training, and developing business models.

Tribal women farmers find their voice

Drought-tolerant rice helps farmers cope in areas that suffer from water scarcity.

Women farmers of a migrant tribal community in India have found their place in the decision-making processes of their community after a drought-resistant rice variety was introduced to their community.

When socioeconomic circumstances forced them to settle by the hills of the Mayurbhanj District in eastern India, they faced new food security challenges. The absence of fertile topsoil in the hills made the land unproductive. The region is also prone to drought. Women, who do a major part of the farm work, lacked access to seeds suited to the dry environment of the hills and found themselves marginalized in decision-making in their households.

Through the Balasore Social Service Society (BSSS), the International Rice Research Institute (IRRI) introduced and supplied a drought-tolerant variety Sahbhagi dhan, after which the Holy Family Catholic Parish started mobilizing the tribal community toward adopting the variety. The Odisha Agricultural Department helped provide training and access to facilities.

Women led the development of a seed bank, which gave them an important role in seed conservation and in the decision-making processes within the family and the community.

Apart from successes in the field with the introduction of the drought-tolerant high-yielding variety, women in the tribe became aware of opportunities to influence decisions made in their households and community. In addition to needing less water for the introduced variety, the tribe can also schedule vegetable cultivation on their farms because Sahbhagi dhan is a short-duration variety.

Women are partners in food production and livelihood in the community.

The gender-inclusive approach was successful in introducing Sahbhagi dhan, and helped raise the status of women in the community.

Fr. Mathew Varghese said that the women were more accepting of change than men, and it seemed that they can take more risks, too. If the community continues to adopt technologies that suit the environment in the area, women will enjoy economic independence, self-confidence, and freedom to take control of family resources.

The gender strategy cuts across all areas of research under GRiSP. This project shows how gender concerns are overcome through collaboration with national partners and other nongovernment organizations.

Drought-tolerant varieties

Drought is a major constraint to both upland and rainfed lowland rice production in Asia and sub-Saharan Africa, regularly affecting about 13 million hectares of rainfed rice-growing areas. Since the year 2000, the water shortage problem has expanded to millions of hectares in affected rainfed lowland and irrigated ecosystems—areas that were earlier believed to have optimum water supply for rice cultivation.

Yield loss in rice due to water shortage exceeds the combined losses incurred from other stresses. The extent of yield loss depends on the severity and duration of drought stress. Drought events are now more intense and severe than 10 years ago.

In the eastern Indian states of Jharkhand, Odisha, and Chhattisgarh alone, rice production losses during severe drought—which occurs about one year in five—average 40% of total production, with an estimated value of US$800 million.

The Stress-Tolerant Rice for Africa and South Asia (STRASA) project started in 2007 at IRRI, in collaboration with AfricaRice, with the aim to develop and deliver rice varieties tolerant of abiotic stresses for millions of farmers in unfavorable rice-growing environments.

STRASA helps partners in India, Nepal, and Bangladesh characterize drought stress in their field experiments. Characterizing the duration and severity of drought stress is important to ensure that experiments represent the type of drought occurrences in farmers' fields.

Molecular techniques are used to speed up the breeding of new varieties that can withstand drought. This is done by crossing traditional drought-tolerant but low-yielding varieties with high-yielding but drought-susceptible ones to develop new varieties that withstand drought yet retain high yields. When a new drought-tolerant variety is developed, physiology experiments are conducted so that researchers can understand why and how the new varieties perform well under drought stress.

Drought-tolerant varieties that were developed and successfully released by IRRI in other countries are Sahbhagi dhan (India); BRRI dhan56 (Bangladesh); Sookha dhan1, Sookha dhan2, and Sookha dhan3 (Nepal); and Sahod Ulan 1 (Philippines). STRASA is helping disseminate these varieties to millions of farmers through the production and distribution of high-quality seeds. The project is also looking to improve locally popular varieties for drought tolerance in consideration of local consumers' preferences in taste, aroma, and texture of rice.

STRASA aims to eventually combine the traits that make a rice plant tolerant of abiotic and biotic stresses to develop rice varieties that could survive various changes in climate.

The InfoLadies of Bangladesh

Seventeen women in Bangladesh have been trained to transfer agricultural technologies through the use of information and communication technologies (ICT) to rural farmers, particularly to other women who face social, economic, and cultural challenges. These messengers of information are known as "InfoLadies."

Equipped with a bicycle, a netbook, and a few other accessories, the InfoLady pedals from village to village and household to household, helping rural folk access the information they need, which may sometimes include legal advice, employment, market linkages, and government services.

The InfoLady model was set up in 2008 by a development organization called D.Net, working with other community organizations, that wanted to reach women in Bangladesh, most of whom face mobility constraints and cannot access opportunities to improve their lives. The InfoLadies are trained for three months on the use of computers, printers, cameras, and the Internet.

As part of GRiSP, the Cereal Systems Initiative for South Asia (CSISA) project in Bangladesh aims to tap into this resource of lively women who can help transfer improved methods and technologies to a wider audience to benefit food production and help farmers generate income from marketing the technologies.

An InfoLady shares knowledge through her laptop on better harvesting techniques.

Most of the 17 InfoLadies are in the CSISA Rangpur hub, although some who took the training course came from the Jessore and Khulna hubs.

The training program covered a wide range of livelihood activities prevalent in the areas covered: improved rice

and maize varieties, improved cropping systems, fertilizer management and application, rice-based postharvest technologies, basic aquaculture and pond management, cage aquaculture, horticulture, and nutrition education.

The program also included field visits to showcase the application of technologies. At the end of the program, a day-long session was held on entrepreneurship development that included bookkeeping, business planning, and customer satisfaction. Other income-generating and business options were also introduced.

The USAID-funded CSISA project empowered young women by training them to provide ICT-based services to those who lack access to basic information on agriculture.

CSISA Bangladesh

The United States Agency for International Development (USAID) agreed in 2010 to finance, within its *Feed the Future* initiative, a Bangladesh-specific CSISA program that uses many of the implementation concepts developed in the subcontinent version of CSISA. The program, known as CSISA Bangladesh, is led by IRRI, co-managed by CIMMYT and WorldFish, and implemented in partnership with national government research and extension institutions, national NGOs, and the private sector.

CSISA is a public-private collaboration that started in early 2009 to support, accelerate, and sustain cereal cropping systems in South Asia.

It aims to test and disseminate new cereal system-based technologies that will raise family incomes by at least US$350 for 60,000 farming families. It is anticipated that a further 300,000 farmers will adopt new technology through participation in field days and farmer-to-farmer information technology transfer.

Two successful components of CSISA Bangladesh are stress-tolerant rice varieties and farm mechanization, which spun off into separately financed projects through which both will be disseminated to millions of farmers.

Building on lessons learned and the technologies developed from the Rice-Wheat Consortium, the Irrigated Rice Research Consortium, and many other public and private sector investments in agricultural research and development, CSISA aims to plan and implement interventions in high-priority areas by creating and facilitating innovative public-private sector partnerships in key hubs.

CSISA Bangladesh represents an agroecological zone with distinct cereal production problems. To reflect the integrated and interdependent nature of components of cereal-based farming systems in Bangladesh, the hub system allows the three CGIAR centers to develop integrated sets of technologies that, when put together, results in a more productive system than the sum of its components.

CSISA, now in its second phase, works in key rice-growing areas of India, Bangladesh, Nepal, and Pakistan. The project has a mandate to improve cereal productivity and farm income in these four countries.

A steady seed supply for the Nepal mid-hills

In the western mid-hill districts of Nepal, women have joined forces to form seed-producer groups. With the shortage of high-quality seeds becoming a major problem, the government of Nepal and the Consortium for Unfavorable Rice Environments (CURE) engaged in an informal seed multiplication system that teaches members of the seed-producer groups to produce good-quality seeds. These women of substance manage their multiple roles as housewives, mothers, and partners in farming and income generation.

"What men can do, women can do better," says Laxima Adhikari, president of the Harrabot Ladies Seed Producers Group in Nepal's Lamjung District, of how their organization came to be. They wanted to prove that women are capable of producing high-quality seeds that can generate higher production and additional income.

"When I saw the men forming their group, accessing information and producing quality seeds, I thought we, too, can replicate their experience and benefit as well," she explains.

Supporting multiple roles

CURE, which is led by the International Rice Research Institute (IRRI), works with women farmers in salinity-, drought-, and submergence-prone rice environments and in upland areas where varying climatic conditions can lead to deeper poverty. In the three mid-hill Nepal districts of Lamjung, Tanahun, and Gorkha, CURE and its country partner—the Institute of Animal and Agricultural Sciences—facilitated the formation of seed-producer groups, provided training on seed production and extension, organized cross-site visits of farmers and extension workers, and supported farmers in acquiring the equipment they need to continue seed production.

Women seed-producer groups and seed cooperatives in the three districts were established to ensure that seeds of improved rice varieties are widely available. This work is an example of how GRiSP brings together partners to increase impact.

The promise of new knowledge and better opportunities inspired Laxima and 34 other women to form the Harrabot Ladies Seed Producers Group in 2010. That same year, the government of Nepal declared that women's cooperatives should be supported and that female farmers be given priority assistance in the form of tax exemption, credit access, and additional training. Project monitoring and technical assistance are provided to seven seed-producer groups and two cooperatives.

Another group, the Mahjuwa Ladies Seed Producers Group, produces seeds of upland and lowland rice varieties and engages in vegetable production, beekeeping, and livestock-raising. These women are also members of a vegetable cooperative established in 2005 and benefited greatly from training activities.

Husbands and other family members of the Harrabot group expressed their support for the additional role of their wives and mothers as seed producers. More importantly, the women are happy and proud of the extra income they generate from the added economic activity.

Reaping the benefits

Usha Sapkota, president of the Mahjuwa Ladies Seed Producers Group, says, "I have been happy and content for the past two years." Usha now has quality seeds on hand and is no longer worried about what to grow in the coming season. "Before this, I did not know that there are new varieties that can improve our rice production."

Many of the women reported an increase in production by more than 50% since they started using high-yielding and drought-tolerant varieties. Members of the Harrabot and Mahjuwa groups also increased their incomes by an average of US$115–345 (Rs 10,000–30,000) per cropping season from the sale of increased harvests of rice, seeds, and vegetables. The extra income is used for vegetable production, home improvements, and children's school fees.

These "women of substance" are leading, influencing, and making a difference in the lives of other women and men in their respective rice-farming communities and, by these actions, are motivating other people to take on multiple roles to improve their circumstances.

An elderly woman from the Mahjuwa Ladies Seed Producers Group welcomes visitors from the Consortium for Unfavorable Rice Environments and the Institute of Agriculture and Animal Science.

The GRiSP mission

GRiSP aims to reduce poverty and hunger, improve human health and nutrition, reduce the environmental footprint, and enhance the ecosystem resilience of rice production systems through high-quality international research, partnership, and leadership.

Objectives

1. To increase rice productivity and value for the poor in the context of a changing climate through accelerated demand-driven development of improved varieties and other technologies along the value chain.
2. To foster more sustainable rice-based production systems that use natural resources more efficiently, are adapted to climate change and are ecologically resilient, and have reduced environmental externalities.
3. To improve the efficiency and equity of the rice sector through better and more accessible information, improved agricultural development and research policies, and strengthened delivery mechanisms.

Global research themes

Theme 1: Harnessing genetic diversity to chart new productivity, quality, and health horizons.

Theme 2: Accelerating the development, delivery, and adoption of improved rice varieties.

Theme 3: Ecologically and sustainably managing rice-based production systems.

Theme 4: Extracting more value from rice harvests through improved quality, processing, market systems, and new products.

Theme 5: Enhancing impact through technology evaluations, targeting, and policy options.

Theme 6: Supporting the growth of the global rice sector.

To support GRiSP's overall mission and objectives, IRRI, AfricaRice, and CIAT have developed a Gender Strategy for GRiSP from 2013 to 2015. The ultimate goal of the Gender Strategy is to reduce the gender gap in the rice sector.

Objectives of the gender strategy

1. To enable women to be as productive as men and to maintain control over new income streams from rice technologies.
2. To increase adoption rates of GRiSP-derived products (improved varieties and associated crop and natural resource management practices) by men and women.
3. To increase the use of participatory research and gender analysis to incorporate women's technology and training needs in each stage of the R & D process.
4. To provide gender-equitable access to technologies, technical knowledge, and agriculture-related information.

To achieve these objectives, gender analysis, gender mainstreaming, and capacity building will cut across Global research themes 2–6. GRiSP's "gender impact pathways' form the basis of the conceptual framework for its gender strategy.

CGIAR is a global research partnership for a food-secure future. Its science is carried out by the 15 research centers of the CGIAR Consortium in collaboration with hundreds of partner organizations.